REMARKS

The official action of 7 August 2009 has been carefully considered and reconsideration of the application as amended is respectfully requested.

The specification has been amended to provide the Abstract on a separate page and in compliance with applicable language and format requirements. The specification has also been amended to provide section headings. The amendments to the specification, which are editorial and clerical in nature, are respectfully believed to address the objections appearing at paragraphs 1 and 2 of the official action.

Claim 11 has been amended to remove the basis for the claim objection appearing at paragraph 3 of the official action. Claims 1, 11 and 17 have also been amended more clearly patentably to distinguish the claimed invention from the claims of US Patent 7,234,505 and thereby to remove the basis for the obviousness-type double patenting rejection appearing at paragraph 5 of the official action, as next discussed.

The double patenting objection appears to be attributable, at least in part, to the use of "comprising". Each of claims 1, 11 and 17 as amended removes that open-ended term. However, in addition to this, the present claims and to the invention of US7234505 are substantially diametrically opposed.

The face-sheet of US 7234505 shows that it corresponds to PCT/AU01/01058

to which reference is made at page 1, line 8 of the present application. As made clear in the following description of PCT/AU01/01058, that application relates to the use of a CEP. As in US 7234505 itself and that description, the CEP is to cause alloy to undergo a change of state, from a molten state to a semi-solid, viscous state. In contrast, the claimed invention uses an FEM which, as specified in each of claims 1, 11 and 17, precludes the molten alloy undergoing a change of state. Thus, it is submitted that the amended claims do not conflict with those of US 7234505, avoiding the non-statutory obvious-type double patenting objection.

Claims 1-24 stand rejected under 35 USC 102(b) as allegedly being anticipated by Murray et al (WO/99/28065). Applicants respectfully traverse this rejection.

Murray et al (WO/99/28065) corresponds to PCT/AU98/00987 to which reference is made at page 1, line 7 of the present application. That reference is then discussed, along with other related applications, through to page 2, line 13 of the present application.

The summary of Murray et al set out in paragraph 7 of the Office Action is respectfully incorrect. Murray et al is specific to molten metal alloy which is a magnesium alloy. The disclosure distinguishes the invention specific to magnesium alloy from what was found to be applicable to aluminium and zinc alloy. The conditions Murray et al teach for magnesium alloy are not applicable to aluminium or zinc alloys.

The Office Action refers to numerous passages of the specification of Murray

et al. These either relate specifically to magnesium alloy, not to aluminium or zinc alloys, or the passages highlight differences between magnesium alloys on the one hand and aluminium and zinc alloys on the other hand. Thus, in Murray et al

Page 1, lines 8 to 12 draw a distinction between Mg alloys and either of Al and Zn alloys.

Page 1, lines 14 to 18 again draw a distinction.

Page 1, lines 20 to 23 indicate that the invention brings Mg alloys up to the quality of Al and Zn alloys, without any suggestion the Murray et al invention is applicable to Al or Zn alloys.

Page 2, lines 22 to 28 point to the Murray et al invention achieving a difference in performance with Mg alloys not encountered with Al or Zn alloys.

Page 5, lines 17 to 19 and page 7, lines 9 to 11 and lines 21 to 24 refer to Al and Zn alloys, but with no suggestion the Murray et al invention applies to those alloys.

Page 8, lines 2 to 5, and lines 26 to 29; page 9, lines 23 to 25; and page 11, lines 5 to 9 point strongly away from any suggestion that the Murray et al invention is applicable to Al or Zn alloys.

Page 18, line 26 to page 19, line 19 highlights why the invention of Murray et al results in a complete contrast between results achieved with that invention and the known performance with Al and Zn alloys.

In addition to these matters, the consideration of Murray et al in the Office Action respectfully does not take into account clear differences between the disclosure of Murray et al and the claimed invention. As indicated in the abstract and the opening paragraph of Murray et al, its disclosure relates to the casting of molten magnesium alloy under conditions in which the molten alloy undergoes a change of state, from molten to thixotropic (i.e. semi-solid). This is achieved by molten alloy passing beyond the outlet end of a runner at a flow velocity of from 140 m/s to 165 m/s and, on passing from the runner, the alloy undergoes a reduction in flow velocity in a controlled expansion region (a CEP) sufficient to bring about the change of state. This enables filling of the die cavity with semi-solid alloy such that die cavity fill progresses as described in relation to Figure 8B (in contrast to the highly turbulent fill described in relation to contrasting Figure 8A).

The claimed invention differs significantly from the disclosure of Murray et al. The invention provides a flow path exit module (FEM) through which alloy flows from the end of a runner. As with a controlled expansion region (CEP) of Murray et al, the FEM increases in cross-section in the alloy flow direction. However, while the CEP of Murray et al causes a reduction in flow velocity which causes a change in state of the alloy from molten to semi-solid, the FEM of the claimed invention causes a reduction in flow velocity which precludes a change in state of the molten alloy. Thus, while Murray et al results in die cavity

fill with semi-solid alloy, the claimed invention achieves die cavity fill with substantially molten alloy which is not thixotropic and, hence, not semi-solid.

Murray et al is concerned with achieving a change of state from molten to semi-solid. The claimed invention seeks to avoid that change, retaining the alloy essentially in its molten state until solidification proceeds in the die cavity, so that the alloy does not attain a thixotropic or semi-solid state. Some minor generation of solid particles can occur, with this increased in the case of cold chamber die casting by primary particles formed in the shot sleeve. However, this is not such as to result in semi-solid alloy.

The use of a FEM, despite not resulting in semi-solid alloy, has a number of benefits. A first benefit is the attainment of a fine microstructure in which any particles present in the alloy are fine and uniformly distributed, as a result of the intense shear forces generated in the FEM. This is particularly beneficial, as particles formed in a cold chamber shot sleeve usually are larger, branched dendritic particles. Also, the shear forces reduce the usual pressure casting defects resulting from gas porosity due to gas entrainment. The fine microstructure, and avoidance of gas porosity usual with pressure die casting, results in enhanced physical properties, in that degredation of properties due to larger particles and gas porosity is avoided.

With specific respect to claims 2, 12 and 18, Murray et al do not disclose a flow velocity in the runner of about 100 m/s to 150 m/s as contended by the Examiner. The passage at page 5, lines 7 to 11, refer to a flow velocity of 150 m/s in the runner, and 100 m/s

in the CEP. Also, the context is that of achieving a change in state for the alloy, from molten to semi-solid, not in the context of avoiding a change of state.

With specific respect to claims 3, 13 and 19, the Examiner's comments respectfully do not address the claim recitations. An increase in the cross-section in the direction of alloy flow inherently will decrease flow velocity. However, the distinction still remains that, in the case of Murray et al, the change of state from molten alloy to semi-solid alloy is to be achieved, whereas the claimed invention is to avoid that change from occurring.

With specific respect to claims 4 to 6, 14 to 16 and 20 to 22, Murray et al teach the need to achieve a runner flow velocity, and a reduction of that flow velocity in a CEP, which produces a change from molten to semi-solid alloy. This necessitates attaining semi-solid alloy with greater than 25 wt% solids, such as at least about 30 wt% solids and up to about 60 to 65 wt% solids. In contrast, the claimed invention is to avoid semi-solid alloy, by ensuring that if the alloy has any solids content produced in the FEM, the present invention needs to achieve less than 25 wt% solids, such as below 22 wt% or below 17 wt%, after allowance for solids which form in a cold chamber shot sleeve. Again, the clear distinction is achieving semi-solid alloy in the case of Murray et al and preventing this in the use of the claimed invention. Moreover, the passages of Murray et al referred to, i.e. page 2, lines 4 to 20, are silent in relation to both temperature and pressure inside the high pressure die casting apparatus.

With specific respect to claims 7 to 10, 23 and 24, a gate may or may not

provide a constriction in Murray et al, and in the claimed invention. However, this does not detract from the clear distinction that Murray et al is to obtain a change of state from molten alloy to semi-solid alloy, whereas the claimed invention avoids that change and retains molten alloy.

In view of the above, Applicants respectfully submit that all rejections and objections of record have been overcome and that the application is now in allowable form. An early notice of allowance is earnestly solicited and is believed to be fully warranted.

Please charge Account No.12-0425 for any fees which may be due by this paper.

Respectfully submitted,

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